

Integrated ray tracing model for end-to-end performance verification of Amon-Ra instrument

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We report the current progress in development of the Amon-Ra instrument that serves as the primary payload of the proposed EARTHSHINE mission. Using the ray tracing based end-to-end simulation tool developed in-house, we studied the in-orbit radiometric performance of the breadboard AmonRa visible channel optical system. The TSI variation and the Earth albedo anomaly, reported elsewhere, were used as the key input variables in the simulation. The output flux at the instrument focal plane confirms that the optical system delivers the correct level of measured power to the detector well within the required measurement accuracy of better than 1%. Using the global angular distribution model (ADM), the measured flux was then converted to the Earth global albedo. The results show a good agreement between the simulated estimation of global albedo and the measurement by Big Bear Solar Observatory. This demonstrates the feasibility that the end-to-end simulation tool and the breadboard AmonRa optical system, both built in-house, can be successfully deployed for the international Earthshine mission, should the flight model be materialised in due course.